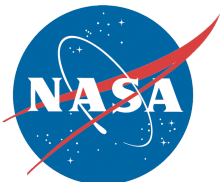


# **NASA Dryden Status**

**Aerospace Control & Guidance Sub-committee  
Meeting 103  
Seattle, WA  
February 2009**

**John Bosworth  
(661) 276-3792  
[john.bosworth@nasa.gov](mailto:john.bosworth@nasa.gov)**



**February 2009**

# LANCETS



- NASA NF-15B #837 last flight flown on Jan 30, 2009
- Last flight phase supported ARMD Supersonics Project  
LANCETS – Lift And Nozzle Change Effects on Tail Shock  
Changed lift with canard command bias  
Changed nozzle exit area  
Vectored nozzles – up, down, split
- Flight results provide truth data for refining the ability to compute trailing shocks with CFD tools



# IRAC F-18 #853 Testbed

- Dedicated Ghz processor for experiment

- Shell & process for Simulink autocode (or c-code)

- Can control commands to:

All aero surfaces (except speed brake)

All pilot inputs

Both engine throttles independently

- Limit checks done by Class A software in RFCS
- Potential for Class A experiment (dual ARTS IV or in quad RFCS) – take to landing?
- Tons of research instrumentation parameters
- Simulated failure of multiple control surfaces

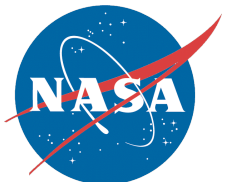


NASA Dryden Flight Research Center Photo Collection

<http://www.dfrc.nasa.gov/Gallery/Photo/index.html>

NASA Photo: EC04-0361-16 Date: December 15, 2004 Photo By: Carla Thomas

NASA's flexible-wing F/A-18 maneuvers through a test point during the second phase of the NASA/Air Force Active Aeroelastic Wing flight research program.



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# Full Scale Flight Experiment Peer Review Selection Process

- Brainstorming within NASA
- Release an RFI for feedback and other ideas from Industry / Academia
- Workshop with Industry / Academia – possibly St. Louis at ACC time
- Final selection by NASA
- Flights in 2011
- Continue process for next experiments

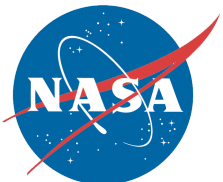


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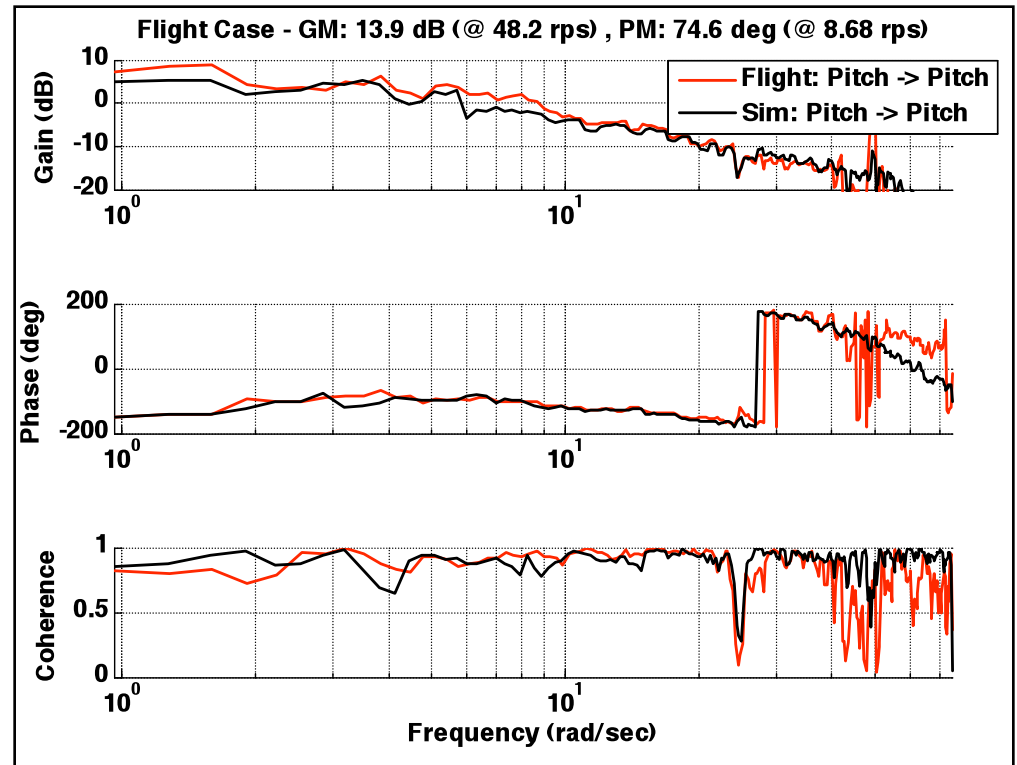


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# X-48B Blended Wing Body

- 44 flights completed
- Initial slats extended and slats retracted stall onset has been characterized
- Flight results providing data for aerodynamic model and simulation updates



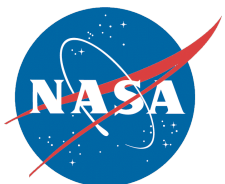
- Adaptive flight control research started for implementation and flights in 2010
- Peak seeking control to optimize in-flight drag reduction
- Low Noise variant to wind tunnel 2009



February 2009

# SOFIA

- **Stratospheric Observatory for Infrared Astronomy**
  - 2.5 m diameter German built infrared telescope
  - Open port cavity
    - » ~24°-57° viewable elevation range
  - Platform is Boeing 747 SP
    - » Capable of 6+ hours of observation time
- **Closed door envelope clearance complete**
  - Structural substantiation emphasis
  - Flight dynamics and handling qualities relatively unaltered by the modification
- **Open door flights scheduled summer 2009**
  - Envelope clearance with a cavity acoustics focus
  - Basic telescope systems characterization
  - Goal for first limited science missions by the end of 2009
  - Autopilot interface development to support science mission navigation requirements is ongoing



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# Ikhana Project Update

- Successful completion of 2008 California Fire Mission
  - Positive feedback from fire commanders on benefit of near real time imageries by onboard geo-rectified infrared mapping.
- Successful completion of acoustics research flights
  - Four flights at low altitude over microphone array
  - Acquire data to validate predictive codes, assist in identifying the dominate noise sources and investigate potential community noise reduction technologies
  - Planning to install 4-blade propeller for further research data
- New contracts to host DoD payload development
  - Pod based payloads to be integrated



- Dryden developed Fiber Optic Wing Shape Sensing
  - Data collected on 18 flights; active during fire missions in the NAS
  - 13Gb data collected with on-going analysis
  - Transitioning from research to instrumentation package



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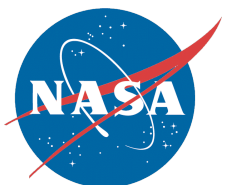
# Orion CEV Launch Abort Systems Tests

- Dryden is leading the test activities for the Launch abort systems test. Tests will be conducted at White Sands, NM
- Pad Abort 1 (PA-1): Tests the basic functionality of the launch abort system from the pad in its preliminary design configuration.
- Ascent Abort 1 (AA-1): Tests the ability of the launch abort system to function while the spacecraft is traveling through the period of maximum dynamic pressure.
- Ascent Abort 2 (AA-2): Tests the ability of the launch abort system to function as the spacecraft approaches the region of maximum drag.
- Pad Abort 2 (PA-2): Continues to refine the data collected on PA-1 on a more production-like crew module.
- Ascent Abort 3 (AA-3): Tests the ability of the launch abort system to perform in the event it is tumbling due to a loss of control of the launch vehicle.
- Ascent Abort 4 (AA-4 or Ares I-y): Test the ability of the launch abort system to perform a high altitude abort.



## Current activities

- Hardware testing and integration of the PA-1 crew module at DFRC
- Preparation for PA-1 FTRR
- AA-1 design



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# To Fly What Others Imagine ...

